Example Grammar

Non-terminal = {statement, condition, function, variable, value}

Terminal = {x,y,a,b,c,d,f1,f2,f3,f4,f5 }
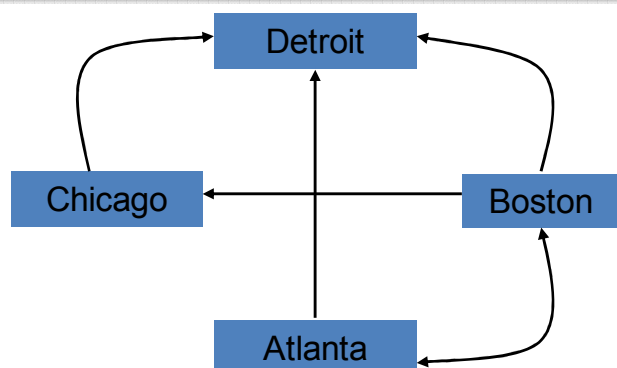
S = <statement>

Production rules:

<statement>::=	IF <cond> <statemnt> Else <statemnt> END;		(0)
	| <function>		(1)
<condition>::= (<variable> > <value>)			
<variable>::=	x	(0)	
	| y	(1)	
<value> ::=	a	(0)	
	| b	(1)	
<function>::=	f1	(0)	
	| f2	(1)	
	| f3	(2)	

If(x > a)   //104, 68, 44

   If(y > b) //216, 17, 61

     (f1)   //123, 230

   Else

     (f2)   //217

   End

 Else

   If(y>c)   //71, 250

     (f3)   //19, 62

   Else

     (f3)   //159, 122

   End

End…

Chi – Det: AAAACCCC   Atl – Det: GCAGCCCC

   ~: TTTTGGGG   ~:CGTCGGGG

Bos– Chi: ACTGGGCT   Bos- Det : ACTGCCC C

   ~: TGACCCGA   ~:TGACGGGG

Bos - Atl: ACTGACTT   Atl - Bos: GCAGTCGG

   ~:TGACTGAA   ~: CGTCAGCC

+Atlanta: ACTTGCAG   Chi: GGCTAAAA

+Boston: TCGGACTG   Det: CCCCGGGG

+Edges (flights) are formed by concatenating the 2nd half of the originating city and the 1st half of the destination city

    Atlanta-Boston: GCAGTCGG

+Each city also has a complementary name

    Atlanta: TGAACGTC

+Synthesize all cities and edges (flights)

+Mix all these sequences in a common test tube along with DNA ligase, salt, …

    Only a pinch (1014 molecules) of each sequence and 1/50th teaspoon of solution needed

+Within a second, you have an answer! How?

+Atlanta-Boston (GCAGTCGG) meets Boston complement   (AGCCTGAC) GCAGTCGG

   AGCCTGAC

+Now, encounter Boston-Chicago (ACTGGGCT)

   GCAGTCGG**ACTGGGCT**

    AGCCTGAC

At least one of the many molecules formed is the Hamiltonian path

All the paths were created simultaneously

    Hundreds of trillions of molecules involved in biochemical reactions

    Massive parallelism

Now the problem is discarding the wrong paths, and keeping the answer

- Step 1: The swarm particles with identical behavioral model are created.
- Step2: The fitness, inverse of the mean square classification error is calculated for all the swarm particles.
- Higher the mean error lower is the fitness of the particle higher is the fitness.
- Step 3: The swarm particle with highest fitness is identified and declared as the global leader. The global leader directs the particles towards better classification results
- Step 4: The other swarm particles tend to follow the leader each equipped with different velocities. The swarm particle with least fitness is provided with high velocities when compared to the particles with better fitness.
   Locality.
- Step 6: The leading swarm particle is allowed to explore its surroundings for better fitness.
- Step 7: The fitness is calculated for all the particles to decide upon the group leader. It can be observed that the same swarm particle may not be the leader every time.

$w(k+1) = w(k) + \alpha \cdot (\beta \cdot \delta)$

α=Learning rate

β=fitness of the swarm leader - fitness of the swarm particle

δ=weight of the swarm particle - weight of the swarm leader

β denotes the speed term, which defines the speed with which the particle has to travel towards the leader.

δ denotes the direction in which the weight has to be modified.

β*δ defines the velocity of the swarm particle.